

## **Prealgebra**

**Prerequisite: Proficiency in 6<sup>th</sup> Grade Mathematics or Math 7**

The goal of Prealgebra is to develop fluency with rational numbers and proportional relationships. Students will extend their elementary skills and begin to learn algebra concepts that serve as a transition into formal Algebra and Geometry. Students will learn to think flexibly about relationships among fractions, decimals, and percents. Students will learn to recognize and generate equivalent expressions and solve single-variable equations and inequalities. Students will investigate and explore mathematical ideas and develop multiple strategies for analyzing complex situations. Students will analyze situations verbally, numerically, graphically, and symbolically. Students will apply mathematical skills and make meaningful connections to life's experiences.

**Standard I: Students will understand and perform operations with rational numbers, including negative rational numbers.**

**Objective 1: Compute fluently with understanding and make reasonable estimates with rational numbers.**

- a. Compute fluently using all four operations with integers, and explain why the corresponding algorithms work.
- b. Compute fluently using all four operations with rational numbers, including negative fractions and decimals, and explain why the corresponding algorithms work.
- c. Check the reasonableness of results using estimation.

**Objective 2: Analyze relationships among rational numbers, including negative rational numbers, and operations involving these numbers.**

- a. Compare and order rational numbers in various forms, including scientific notation (positive and negative exponents), with and without a number line.
- b. Predict the effect of operating with fractions, decimals, percents, and integers as an increase or a decrease of the original value.
- c. Recognize and use the identity properties of addition and multiplication, the multiplicative property of zero, the commutative and associative properties of addition and multiplication, and the distributive property of multiplication over addition.
- d. Recognize and use the inverse operations of adding and subtracting a fixed number, multiplying and dividing by a fixed number, and computing squares of whole numbers and taking square roots of perfect squares.

**Objective 3: Solve problems involving rational numbers using addition, subtraction, multiplication, and division.**

- a. Recognize the absolute value of a rational number as its distance from zero.
- b. Evaluate numeric expressions, including those with whole number exponents and absolute values, using the order of operations.
- c. Solve problems involving rational numbers, percents, and proportions.

**Mathematical Language and Symbols Students Should Use**  
integer, rational, scientific notation, identity, commutative, associative, distributive,  
square, square root, absolute value, order of operations,  $a^b$

**Standard II: Students will use the language of algebra to analyze and represent relationships, including real-world relationships.**

**Objective 1: Generalize and express patterns using algebraic expressions.**

- a. Compare representations of a relation using tables, graphs, algebraic symbols, and mathematical rules.
- b. Describe simple patterns using a mathematical rule or algebraic expression.
- c. Create and extend simple numeric and visual patterns.

**Objective 2: Evaluate, simplify, and solve algebraic expressions, equations, and inequalities.**

- a. Evaluate algebraic expressions, including those with whole number exponents, when given values for the variable(s).
- b. Simplify algebraic expressions.
- c. Solve single-variable linear equations and inequalities, including those that must be simplified on one side or those with variables on both sides of an equation.

**Objective 3: Represent relationships using graphs, tables, and other models.**

- a. Identify approximate rational coordinates when given the graph of a point on a rectangular coordinate system.
- b. Graph ordered pairs of rational numbers on a rectangular coordinate system.
- c. Graph linear equations using ordered pairs or tables.
- d. Model real-world problems using graphs, tables, equations, manipulatives, and pictures, and identify extraneous information.

**Objective 4: Model and illustrate meanings of ratios, percents, and decimals.**

- a. Compare ratios to determine if they are equivalent.
- b. Compare ratios using the unit rate.
- c. Recognize percents as ratios based on 100 and decimals as ratios based on powers of ten.
- d. Recognize the slope of a line as the constant ratio of the vertical change to the horizontal change in a line using similar triangles.
- e. Graph proportional relationships and identify the unit rate as the slope of the related line.

**Objective 5: Solve a wide variety of problems using ratios and proportional reasoning.**

- a. Set up and solve problems involving proportional reasoning using variables.
- b. Solve percent problems, including problems involving discounts, interest, taxes, tips, and percent increase or decrease.
- c. Solve ratio and rate problems using informal methods.
- d. Identify similar figures based on proportionality.
- e. Find missing lengths of similar plane figures, including inaccessible lengths, using proportions.

<p><b>Mathematical Language and Symbols Students Should Use</b></p>
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<p>algebraic expression, equation, inequality, variable, linear, rectangular coordinate system, rational, ordered pair, ratio, proportion</p>
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**Standard III: Students will understand and apply measurement tools and formulas.**

**Objective 1: Apply the properties of proportionality of different units of measure.**

- a. Convert units of measure within the same system.
- b. Create and interpret scale drawings and approximate distance on maps using properties of similarity.
- c. Solve problems using scale factors.
- d. Create and interpret scale drawings.

**Objective 2: Derive formulas for surface areas and volume of three-dimensional shapes.**

- a. Derive formulas for and calculate surface area and volume of right prisms and cylinders using appropriate units.
- b. Explain that if a scale factor describes how corresponding lengths in two similar objects are related, then the square of the scale factor describes how corresponding areas are related and the cube of the scale factor describes how corresponding volumes are related.
- c. Find lengths, areas, and volumes of similar figures, using the scale factor.
- d. Select appropriate two- and three-dimensional shapes to model real-world objects and solve a variety of problems involving surface areas and volumes of cylinders and prisms.

<p><b>Mathematical Language and Symbols Students Should Use</b></p>
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<p>unit of measure, scale, scale factor, surface area, volume, prism, cylinder</p>
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**Standard IV: Students will apply concepts and methods from statistics and probability to solve real problems.**

**Objective 1: Formulate questions and answer the questions by organizing and analyzing data.**

- a. Formulate questions that can be answered through data collection and analysis.
- b. Determine the 25<sup>th</sup> and 75<sup>th</sup> percentiles (first and third quartiles) to obtain information about the spread of data.
- c. Graphically summarize data of a single variable using histograms and box-and-whisker plots.
- d. Compute the mean and median of a numerical characteristic and relate these values to the histogram of the data.
- e. Use graphical representations and numerical summaries to answer questions and interpret data.

**Objective 2: Calculate probabilities of events and compare theoretical and experimental probability.**

- a. Solve counting problems using the Fundamental Counting Principle.
- b. Calculate the probability of an event or sequence of events with and without replacement using models.
- c. Recognize that the sum of the probability of an event and the probability of its complement is equal to one.
- d. Make approximate predictions using theoretical probability and proportions.
- e. Recognize that results of an experiment more closely approximate the actual or theoretical probability of an event as the number of trials increases.

<p><b>Mathematical Language and Symbols Students Should Use</b></p>
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<p>data, percentile, histogram, box-and-whisker plot, spread, Fundamental Counting Principle, complement, theoretical probability, experiment</p>
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